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An Analytical Approach to the Function and Dating of the Great Southern Tower at Rab'e Rashidi in Tabriz

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Abstract

Problem statement: The visible remnants of Rab'e Rashidi in Tabriz, as a fortified site at the present time, are curtain walls and towers. Imagined as an Ilkhanid observatory and recorded as the artillery tower built by Shah Abbās the Great during his 1603 AD campaign, the great southern tower of Rab'e Rashidi is located at the southern curtain wall. The recent field studies on the structure of this tower have questioned its function for artillery tower. Therefore, the basic questions proposed by the authors are related to the relative dating, function and historical presence of this tower in Rashidiyya.

Research objectives: The aim of this research study is the systematic understanding of the age and function of this monument as a guide to proper planning of its restoration and conservation.

Research method: The analytical approach to architecture, field studies of structure and physical setting of tower, in addition to the history of ordnance in Safavid and Ottoman armies are the basic research methods were applied in this study.

Conclusion: The tower has been built by the plan and order of *Cigala Joseph Sinan Pasha (Zigala Bassa Capitano del Mare)* the Ottoman ruler of Tabriz (1585-1603). Strongly has not been affected by 7.7 earthquake of Tabriz 1780, the basic function of such a great tower is not simply confined to artillery tower, but instead is supposed to be a stronghold to deploy a musketeer company of Ottoman Janissaries to cover 180^{o} fire wall for southern lowland areas of the southern curtain wall, including the western upper gate, two water wells at the east of tower, and also the northern bank of Mehrānrūd River and hills of Valyānkūh. Moreover, adobe, mud-brick, clay and wattle & daubed structures visible throughout top of the great tower and across the small towers and curtain walls are the same remnants of quickly reconstructed and repaired Fort of Rashidiyya ordered by the Safavid Shah Abbās the Great, in 1610.

Keywords: *The Rab'e Rashidi, The fort of Rashidiyya in Tabriz, Analytical approach, Historical subjectivity, Archaeological objectivity.*

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Introduction

Today, the ruined walls and ramparts of a fort are remained from the Rab'e Rashidi at the foot of Mt. Surkhāb, situated in Valyānkūh, the NE of Tabriz. However, the Rab'e Rashidi, as written by Hamd-Allāh Mostawfi Qazvini in his *Nozhat al-Qolub* (1340), was a 'Shahrcha' (township in the 14th AD Persian) for physicians and scholars that was designed and built during the period ruled by Öljeitü the Mongol. As written by Khwādja Rashid al-Din Fazl-Allāh Hamadāni (1977) in his *Waqf Nāma Rab'e Rashidi* (1300) or the writings of Hamd-Allāh Mostawfi Qazvini (1340) and *The History of Öljeitü* (1318) by Abu al- Qasim Kāshāni, there is no indication of such a fort in the architectural structure of Rab'e Rashidi 'Shahrcha' (Ajorloo, 2013).

From the Late Ilkhanids until the Early Safavids, there is no report on this fort. By the summer 1585, Özdemir Zāda Ottoman Pasha, the brigadier serving for the Ottoman King Murad Khan III, took control of Tabriz and built a fort in 'Nasiriyya' of Tabriz. After his sudden death (1585), the Ottoman Cigala Joseph Sinan Pasha became the Ottoman governor in Tabriz and Azerbaijan (Tektaş, 2009, XLIII-XLIV; Minorsky, 2015, 57) until then, by 1603, Shāhsevan cavalries of Safavid Shah Abbās the Great, reported by *Ālamārā-ye Abbāsi* (1627), took advantage of the counter Ottoman rebellions in Salmas and Khoy and rushed speedily from the NE of Tabriz toward the 'Fort of Rashidiyya' where few of Janissaries entrenched. The interpretation of historical sources, therefore, suggest that during the ruling of Ottoman Cigala Joseph Sinan Pasha (1585-1603), the remnants of Rab'e Rashidi turned into the 'Fort of Rashidiyya' in confirmation of these pre-1585 historians are silent about the military use of this place; Also J. B. Tavernier (1605-1689) the famous French traveler and merchant has written in his *Les Six Voyages* (1676) that fort in the downside of Mt. Surkhāb was built by 'the Ottomans' but now it is no more than an abandoned ruin.

The problem statement

As the highest and colossal among the 11 towers of the Rashidiyya fort, the function and dating of the Great Southern Tower (GST) constitute the basic questions in this study; because former researchers on the basis of their historical subjectivity, rather than archaeological – architectural objectivity, has supposed GST as an artillery tower (e.g. Omrani, Aminian & Asadzadeh, 2013). According to such a historical subjectivity, it is imagined that Safavid Ordnance was strongly shelling the Ottoman strongholds in Tabriz; moreover, they have imagined the structure as the same 'Dawlat Khana' (the palace of governorate) for Azerbaijan and Tabriz which built urgently by Shah Abbās the Great in 1603-1604 (ibid.).

By the historical subjectivity, the opinion of artillery tower seems reasonable to explain the aim, plan and function of GST. Architecturally, nonetheless, if one considers the measurements, dimensions and analyzes its engineering features and planning, it would be understood that is impossible to plan and to construct such a huge and tall structure urgently in one year. Furthermore, if one remember that history of ordnance has record neither Safavid nor Ottoman long-range heavy artillery in the battlefield of Tabriz, any hypothesis on the existence of an artillery tower would be perished; and consequently, it would be realized that former researchers has synthetically and none-analytically imposed their historical subjectivities on the existing objectivities[1]. Therefore, these are basic questions and main hypotheses of the authors: What was the aim and function of great southern tower in Rab'e Rashidi? And, is the whole of this structure made by Shah Abbās the Great in 1603?

On the basis of their abductive reasoning, the authors have hypothesized that GST is planned and made by the order of Ottoman Cigala Joseph Sinan Pasha for defending of southern and east fronts of the Rashidiyya Fort and its upper western gate as well; due to the slight slope of lands in these fronts the southern rampart of the fort could be very vulnerable facing with the targeted Safavid attack of infantry and cavalries. Furthermore, the Ottomans did find it possible to keep two water wells in the south of rampart away from the Safavids. The hypothesis explains that GST has no usage in artillery as there are no archeological evidences and historical documents on long-range heavy artillery during the Safavid – Ottoman battles over Tabriz. Such a hypothesis by the authors recognizes the final / upper layer of mud brick, clay and earthen plaster throughout the top of GST and curtain walls, as the urgently refurbishment ordered by Shah Abbās the Safavid in 1610: The logistic supplies of Shah Abbas's army fall within a limited time under the Ottoman imminent threat forced him to build such upper clay structures urgently.

Theoretical background

The restoration program of GST represents the significance of answering these challenging questions and constitutes its theoretical frame work in this study; therefore an appropriate recognition and systematic research of the development, function, nature and identity of a historical and archaeological monument / site is of prime importance in planning and designing any restoration work and constitutes an unavoidable challenge along with proposing an essential introduction. [2] In this regard, no restoration team can do the job appropriately without a historical / archaeological understanding on a historic / ancient architectural monument. According to the Doctrine of Fielden (2007, I-II), identifying and observing the functional authenticity of a desired monument, the way the structure is structured, and the historical or natural causes of the destruction of the work, will determine the patterns and strategies of its future restoration and also will define its new functions in the post-restoration phase. Finally, it should be re-noted that authors have reasoned on abduction[3].

Research background

Archaeologically and architecturally the GST is not yet well studied else the former two suggestions related to the Ilkhanid observatory and artillery tower[4].

For the first time, de-historized hypothesis of D. N. Wilber (1955) presented the GST as an Ilkhanid observatory of Khwādja Rashid. It should be noted that D. N. Wilber's misinterpretation of Persian historical records and his less attention to physical appearances in Ilkhanid architecture to postulate synthetic and none- analytic hypotheses is not limited to the GST; Similarly he has imagined the iwān of Arch of Alishāh as the same praying sanctuary of grand Friday mosque of Alishāh of Tabriz (Ajorloo, Mansouri, 2006; Ajorloo, Nemati- Babayloo, 2014). Despite Wilber's hypothesis, Khwādja Rashid (1303) in his *Tārikh-e Mubārak-e Ghāzāni* has only recorded two Ilkhanid observatories: Maragha and Ghāzāniyya. Meanwhile neither Khwādja Rashid by his *Waqf Nāma Rab'e Rashidi* (1300) nor Abu al-Qāsim Kāshāni (1318) and Mostawfi Qazvini (1340) have reported any observatory in Rab'e Rashidi.

Nonetheless, the second group of hypotheses, based on historical reports, imagined that tower should have remained out of the rampart mounted quickly by Shah Abbās the Great in 1603 with no architectural precision (e.g. Omrani, Aminian & Asadzadeh, 2013). Though, Nāder Mirzā Qajar (2014, 239) in his *Tārikh O Geography Dār al- Saltanat-e Tabriz* wrote that is carefully built, precisely and firm! On the other hand, former researchers who proposed the de-historized synthetic hypothesis of artillery tower with no architectural- engineering analyzing of the structure (e.g. Ruhaguiz, 2006; Omrani, Aminian & Asadzadeh, 2013) has followed the analogous reasoning; regardless to this evident that 15th – 17th centuries historical resources of ordnance and ballistics has clearly not recorded that Safavid long range heavy artillery was shelling the Ottomans from the GST.

Methodology and analysis of data

In this research the applied methodology is based on two approaches encompassing analysis of architectural features as well as the engineering values concerning the GST in Rab'e Rashidi, besides the historical reports towards both Ottoman and Safavid ordnance in the battlefield of Tabriz.

- **Structural features of the GST**

The Great Southern Tower (GST) in Rab'e Rashidi is a high heavy tower measuring 12 meters at its maximum height and 27 meters for its diameter which has been full projected from the southern curtain wall by an intermediate perpendicular bridge-shaped access strip that fill-up the approximate 17 meters gap between the tower and back enclosure (Fig. 1).

Despite its ruined condition and cylinder form, the tower presents an insensible truncated cone. Accordingly, this insensible decrease of its circumference with a slight slope has played a vital role in guaranteeing the stability of the whole structure in which destructive waves of the 18th century earthquakes has not caused any damage to destabilize the tower (Ajorloo, 2017).

Here, the main masonry consists of cobblestones of varying size in connection with lime mortar while a set of massive stone blocks of tomb stones are projected in different levels and a mesh of timbers facilitates the whole complex enduring the tensile stress. Although brick was an accessible material for master builders around the site, under special circumstance, they did prefer to use stone. The application of cuboid tomb stones from the 14th - 15th centuries is an indication to improve compressive stress stability in connection with timbers, but this combination does not obey the same juxtaposition in both the cylindrical body of tower and the bridge-arm which once gave access to top of the southern curtain wall. To achieve the maximum failure capacity against earthquake and displacement, at the first, a 3 meters height level of cobble masonry with lime mortar has been created with three rows of square stone masonry in the outer elevation and had been flattened to set the stage for the next level. Then, a collection of earlier tomb stones has been projected into a roughly 1.5meter depth layer of cobblestones and lime mortar to recover its function against compressive stress.

Fig. 1. A view from the cylinder structure and intermediate perpendicular bridge-shaped access strip behind the GST. Source: the authors.

With the aim of completing the configuration of the tower, another 1. 5 meter-depth layer of the same substance holds the timber mesh which has been strengthened with an additional layer of tomb stones on top. What finalizes the stone platform before clay extensions is an approximately 2 meters depth layer of cobblestones and lime mortar which has been flattened precisely. Most of what can be seen on the upper section is the remains of mud bricks and clay measuring 2 meters which had been used as embrasure and fortress for the tower wardens. Considering the archaeological excavation in 2017, the authors suggest three distinguishable construction phases for the later extension's stratigraphy as follow (Fig. 2; Table 1):

The first layer (I-xi), which is located on the stone roof of the GST, consists of mud bricks, broken bricks and stratum coated by an earthen plaster made of precisely sieved clay soil while the quality of the upper layer (II-i) signifies a heterogeneity in texture of the tile fragments and sherds belong to the 14th and 15th century besides a layer of reused brick. In other words, in compare to the first layer (I-xi), it lacks the order and precision arrangement of materials. Finally, a shallow deposit of ruined materials of embrasure and merlon (II-ii) has

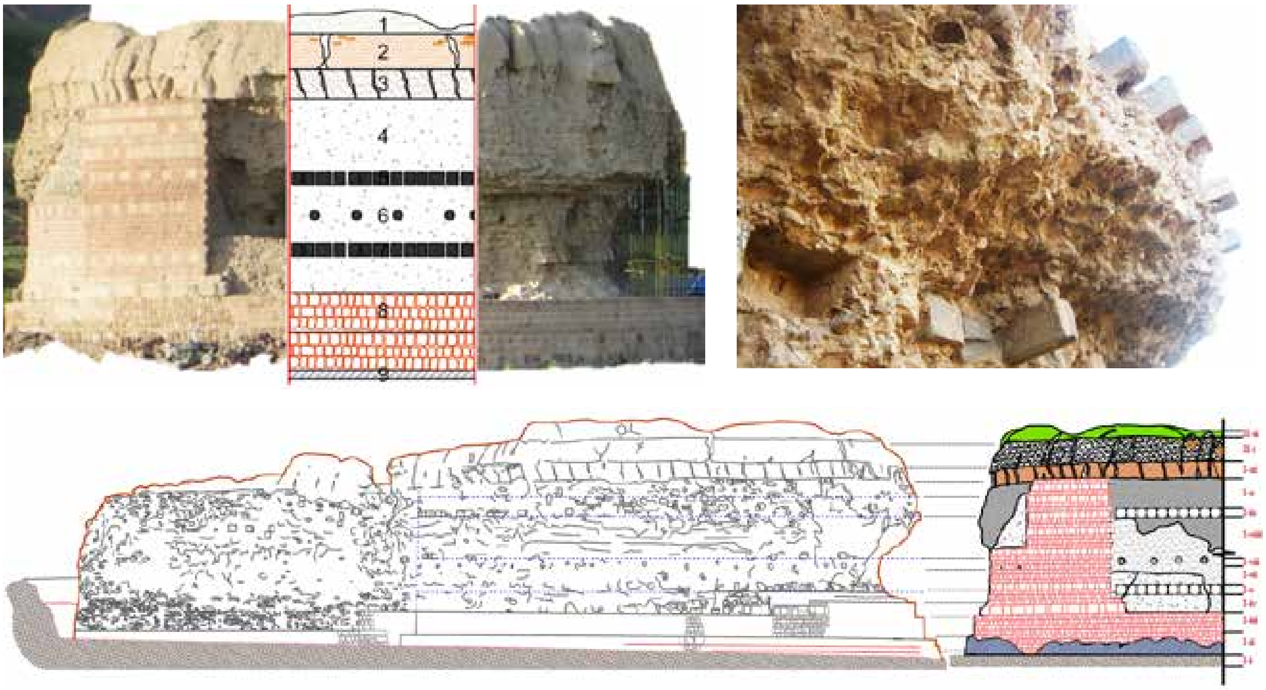

Fig. 2. The architectural stratification and construction phases of the GST. Photo and modeling by A. Moradi. See Table No. 1.

formed the uppermost layer of the tower. Also, it should be noted that the outer layer of the lower clay structure (I-xi), which is located on the rocky bed of the tower roof has been eroded and cracked up due to harsh rainfalls and snowing, while the installation of reused bricks in the middle layer (II) has introduced a homogeneous context preventing the collapse of materials at upper layer due to the possible cracks in the lower layer of the tower.

When it comes to the construction of the bridge-arm structure, the tomb stones are totally absent and it does not seem to face the same challenging of the tower itself. Anyway, timber meshes have only applied in the northwest corner of the lower wall where the wall meets tower to strengthen the stability of this corner as well (Fig. 1).

Abu al- Qāsim al- Kāshāni (1318) by his splendid book *Tārikh-i-Öljeitü* has pointed out that the Mt. Surkhāb supplements the water requisites of Rab'e Rashidi district. Hence, it would not be strange if one considers the existence of clay pipes in far point of the intermediate wall as part of an engineered irrigation system and watering components that provides water supply.

The appearance of 14th – 15th tomb stone in two varying levels not only compensate the urgent need of building materials for master builders, but also treated as an integrated whole in connection with timber meshes to withstand mechanical forces and improve its seismic behavior by distributing load across two surfaces. In short, although the exact force distribution is difficult to determine, given the existence of stones of varying sizes in the structure of the tower, the maximum displacement must be controlled by the stones of greater size. Considering a simplified diagram of force distribution through two axes of X and Y, by removing massive bearing tomb stones, thrust line will affect the foundation in a discontinuity manner, causing fracture. Figure 3 indicates that how crucial this principle is to consider the heterogeneity of the different materials for ensuring the equilibrium of the tower by unifying forces in each layer of tomb stones and transferring it to the next levels until the foundation; as the layered tombstones in combination with tensile elements of wood fiber (logwood mesh) are ideal for stability of the tower.

- **Endoscopic inspection of logwood mesh in the GST**

During the first campaign of international

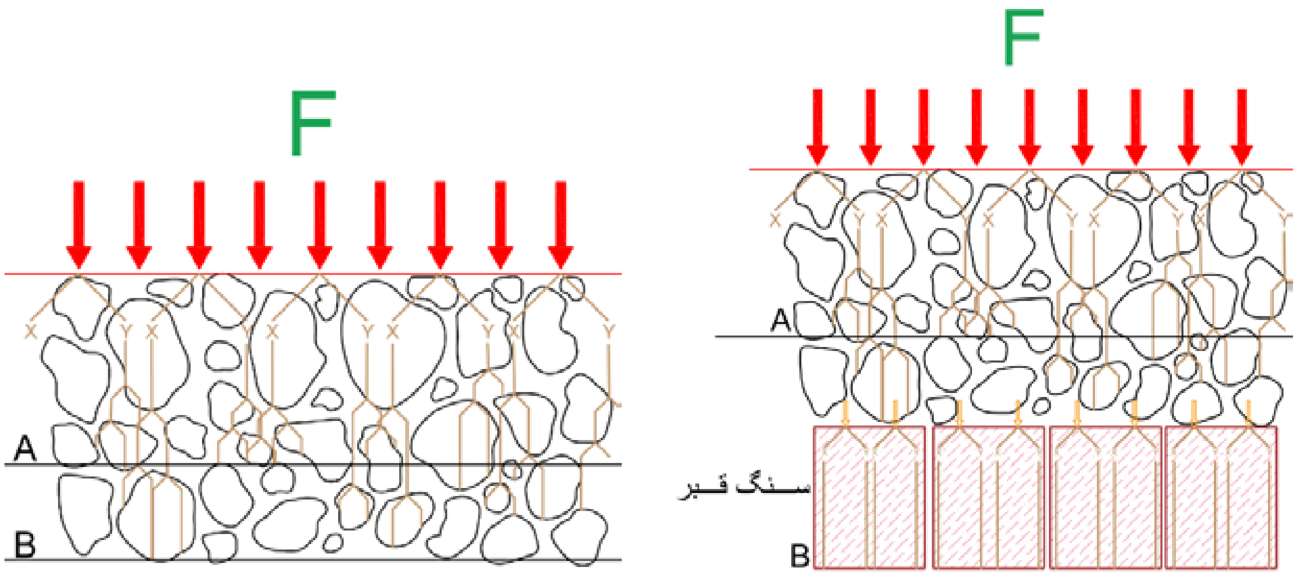

Fig. 3. The schematic view of force distrusting over the GST. Modeling by A. Moradi.
Right: a matrix of lime mortar and cobblestones with different soil gradation is distributing of an equal force (F) is distributed unevenly on the aligned levels of (A) and (B).
Left: A matrix of cobblestones and tomb stones; The unequal force distributed in aligned level (A) after transferring to the tomb stone network, distributed evenly to the lower part of (B).

archaeological expedition to Rab'e Rashidi (2017) endoscopy technique has been applied for the first time to have a better understanding of the holes` structure inside the logwood mesh which have evolved over time due to the deterioration of the wooden clamps and the holes of those were the position of timbers before their deterioration over the course of ages (Ajorloo, 2017). The observational outcomes affirm that there is a length of more than 11 meters for some timbers which had been interlocked in both horizontal and perpendicular directions extending to the middle of the tower (Fig. 4).

There is no question that the implementation of timber meshes in the cylindrical part is an indication of its relative priority to the intermediate wall. Field studies as well as endoscopic observations approve the presence of a wind blowing and air circulation caused by continuous joints between timbers inside the wooden hole's net. In other word, one might understand that timber mesh had been created by carving and fixing them together along their length, at the junctures, as the net reinforcement is secured by creating the most links and interconnections. (Fig 4).

- **The physical setting of GST**

Rashidiyya curtain walls are located on top of a natural rock in the foothills of the Mt. Surkhāb, NE of Tabriz. Geo- morphological factors had a significant role in shaping this site as an approximate isosceles triangle with 360 meters for its base in south, ending to the Mehrānrūd River, while the western chord is 535 m and its eastern lane 515 m; these seem two narrow valleys and mainly dry water courses attaching to the Mt. Surkhāb.

Approaching the site from the south, the GST has been located in the base of this triangle facing the northern bank of the Mehrānrūd River. Our assessments of average elevation from MSL and slope in its eastern and western directions (1450m and 40^0 respectively) would inevitably holds more solid clues so that, infantries had rarely had a chance for an effective maneuver in this part. On the other hand, these factors in north-south axis have been decreased from 1469 meters and the average of 40^0 to 1433 meters and the average of 6^0 where the tower is located. Without the existence of GST, this slight slope would have been the most desirable front for persistent attacks imposed by both infantry and cavalry (Fig 5). Therefore, military tactics advise to keep stronghold at south and south-eastern part of the Rashidiyya fort.

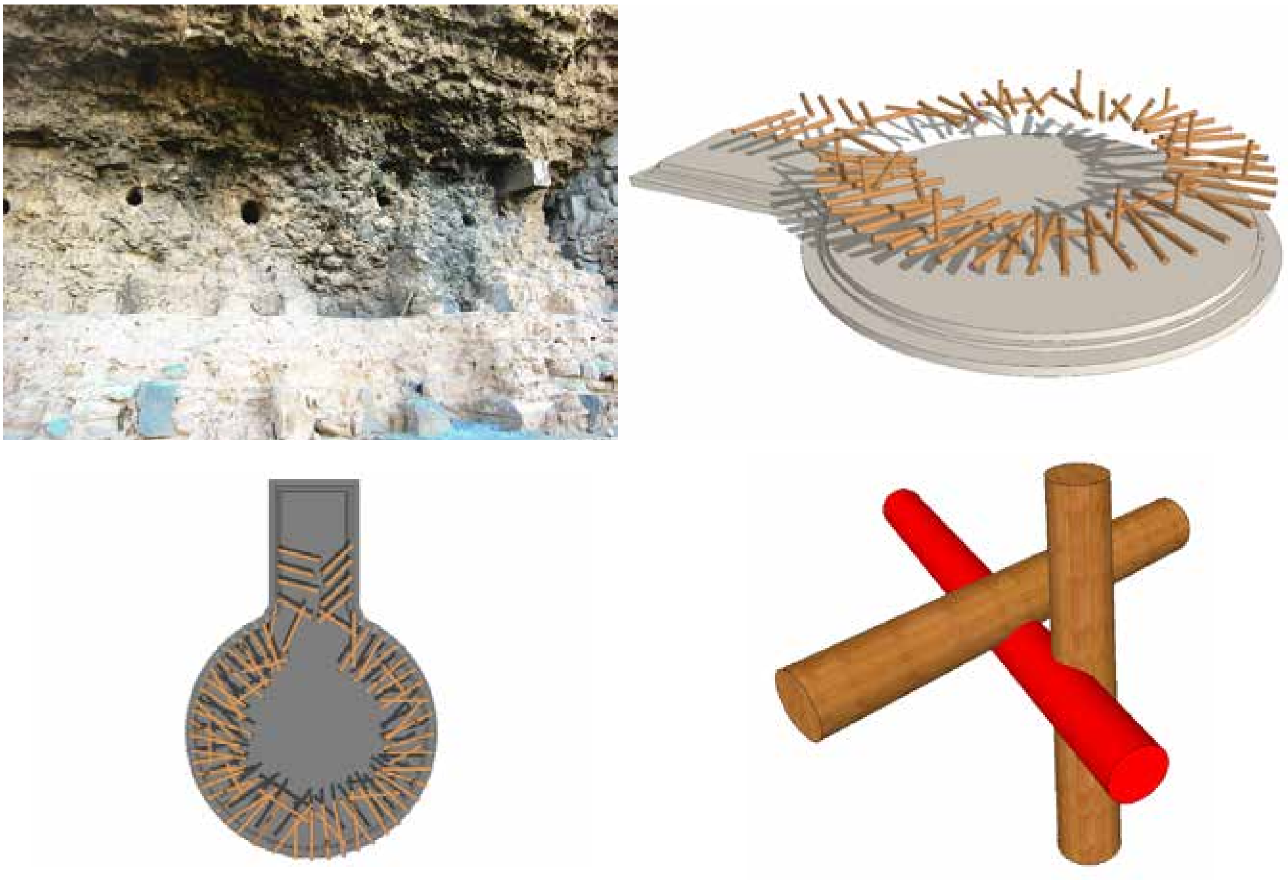

Fig. 4. A matrix of wooden mesh applied into the GST. The details of this wooden mesh are observed by means of endoscopic technique used by the authors, 2017. Photo and modeling by A. Moradi.

The absent of any T-joints between the intermediate wall and the rampart as an enclosure is a sign of further extensions in the years to come after finalizing the whole enclosure (Fig 6).

At the first glance, once upon a time, a royal gate was hypothesized over here which had been later vanished by adding the GST, while the 2nd archaeological campaign of authors (2018) has rejected such a hypothesis (Ajorloo, 2018).

• Ordnance in the Safavid – Ottoman battles over Tabriz

Historians record that ordnance was deployed three times during the Safavid - Ottoman conflicts over Tabriz:

First, in 1585, the army of Ottoman king Sultan Murad Khan III, in a battle counter the troops of the Safavid king Sultan Mohammad Khodabanda, entered in Tabriz after they could destroy the defensive walls and ramparts of the city by deploying of ‘Qal’a Kūb’ (means castle destroyer) type cannons (Mathee, 1999).

Second, during the battles of 1603-1604 over Tabriz and Urmia between the armies of Shah Abbās and the Ottoman Sultan Ahmad I, as written in the Ottoman history of *Topçūlār Kātib Tārikhi*, the Ottoman Cigala Sinan Pasha, originally from an Italian descent (converted to Islam), ordered to cast in Erzurum 100 ‘Zarbazan Shāhi’ and 20 ‘Zarbazan Miāna’ for the battle over Azerbaijan (Soyluer, 2016) though he was defeated by the Safavids before to deploy his ordered arsenal from Erzurum. It should be noted that maximum range of Ottoman artillery was not more than 1000 meters (Aydüz, 2011, 2015; Ágoston, 2014). Also as written by *Ālamāra-ye Abbāsi*, the Ottoman Murad Pasha did quickly withdraw his army from Azerbaijan in 1610 after he was being informed of the arrival of the Safavid Shah Abbās in Tabriz

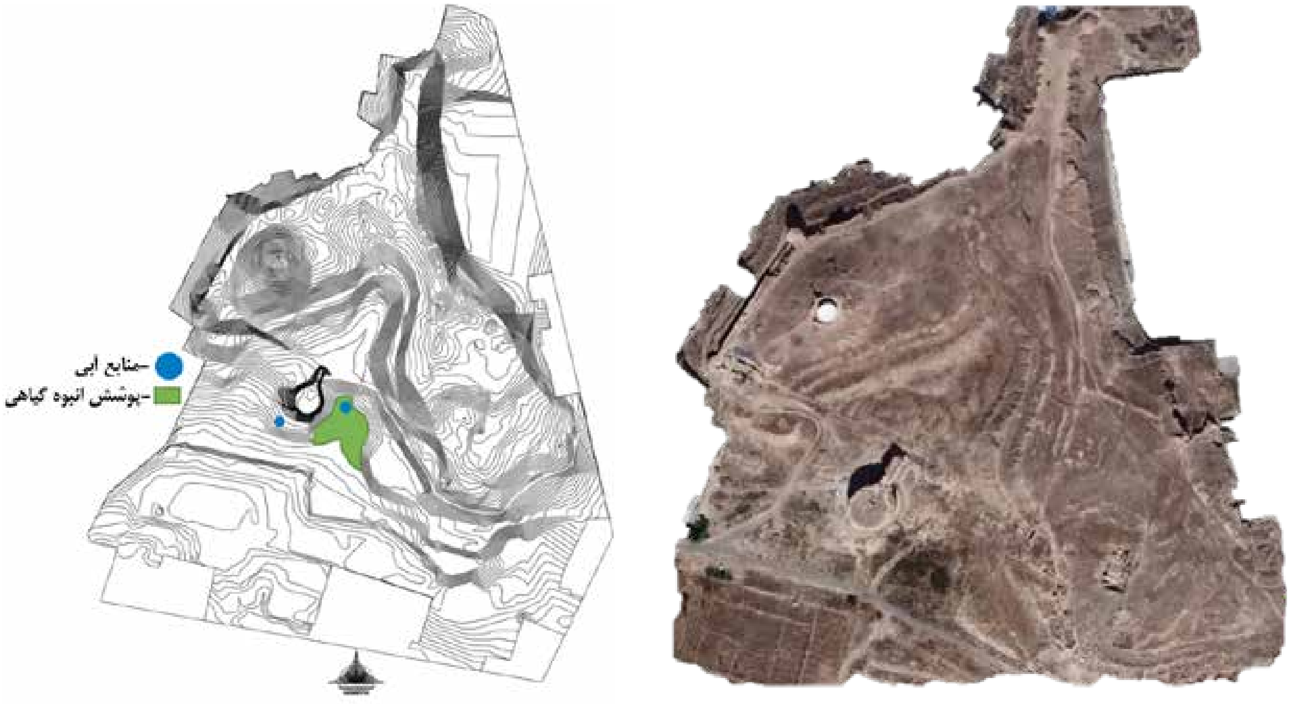

Fig. 5. Aerial photo and map of geo- morph of the Rashidi Fort and water sources (bule) and bush (green) at the east and south of the GST. Source: Drawing by A. Moradi after the Google Earth, 2016.

and his urgently repairs of the 'Rashidiyya Fort' (Minorsky, 2015, 58-59).

Third, according to *Jāhān Namā* composed by Hāji Khalifa the Ottoman Sultan Murad Khan IV came to Tabriz not to conquer but to plunder; and finally he returned to Istanbul after three days (Ibid, 2015, 59-60).

After all, the Safavid arsenal deployment and artillery pieces were either purchased from the Europeans or plundered from the Ottomans; and if they did try to cast their ordnance themselves, it would follow the European types (Mathee, 1999). The Safavid had light artillery nicknamed as 'Zarbazan' and heavy ones famed as 'Qal'a Kūb' or 'Kalla Gūsh' though their ballistic, physical and mechanical specifications are still unknown and there is no Safavid cannon remained. 'Falconet' is another European light caliber gun (30- 50 mm) for infantry and anti-infantry purposes. Shah Abbās the Great purchased 'Falconets' from the Europeans. In the meantime, 'Zanbūrak' is another type of light caliber short range and anti-infantry gun mounted on camels and came into deployment during the time of Safavid Shah Abbās (Mathee, 1999; Kaushik, 2014, 105-117; Aydüz, 2015).

Discussion

Discussion on the analyzed data should be categorized into the GST and Ordnance:

- **The GST**

This is a serious concern when an intermediate wall leading to a projected tower outside an enclosure falls in an unidentified category in the Iranian history of defensive architecture (Fig. 6). Thus, it seems necessary to consider non-Iranian cases to overcome this contradiction by focusing on those were similar to the Byzantine Caesarea Maritima, the English 12th Framlingham as well as the French 12th Carcassonne[5]; regardless of military expedients and gently rising slope of the southern and SE directions in Rab'e Rashidi that raised the possibility of being under attacked by infantry and cavalry special location (Fig. 7).

The definite feature of a full projected tower in the Byzantine fortress of Caesarea, located in the Mediterranean Caesarea Palestinae, has being traced

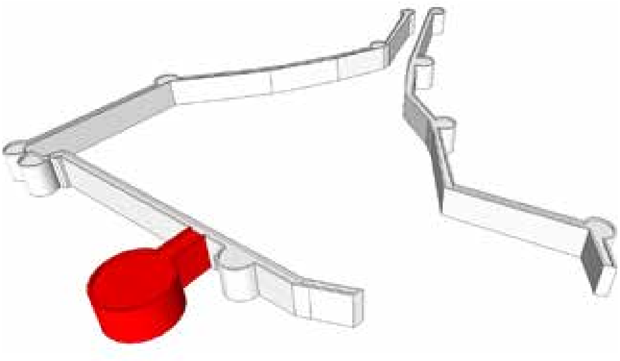

Fig. 6. The GST as a full projected feature, by its 180º view, is attached to the southern curtain wall of Rab'e Rashidi. Modeling by A. Moradi.

to where a ship would anchor (Molin, 1998) while in the English Framlingham the common approach is to meet the riverside to guarantee the warriors' safe access to the fresh water (Plowman, 2005, 43-49). In the French Carcassonne, this technique attracted a high attention to access the River Aude (Panouillé, 1999, 7; Cowper, 2006, 20-1).

It is also clear that in Rab'e Rashidi, the projection of the GST to the southern rampart of the fort, in addition to converted it to a high scout tower by surveillance over the Valyānkūh hills and the northern riverside of Mehrānrūd, also provided it by a fire cover of 180º to guard the western gate and the easternmost part of the fort`s rampart; while it was also equipped with two nearby water wells (Fig. 5 & 6; Fig. 8).

One might even go so far as to say that the evidence of pottery pipes in the intermediate wall not only prove the watering admissible mechanism, but the grassy field around the tower is an indicate to humidity and water circulation related to these water wells.

With regards to the application of lime mortar, authors give an approximate more than twenty months to create such a huge structure based on the available physio-chemical analysis (Hanley, 2006; Hanley & Pavia, 2007). Lime mortars set very slowly, as Carbon dioxide works with the lime producing a growth of tiny interlocking limestone crystals, which binds them together by attaching the particles. Although this reaction may take place quite quickly on the surface, it can take at least 60 days to spread through the mortar in a thick wall. What the experimental data suggests, a minimum of 120 days is required to make the substance and at least 60 days to complete the moisture evaporation process for 1m^3 of lime mortar untill the next load. Hence, in order to have a stone tower of 10m height and 27m of diameter using lime mortar, allocating a minimum period of twenty months is inevitable. So, providing of lime mortars ask some 120 days, every loading of 1m 3 of lime mortars take more than 60 days and then 480 days in total. Above all, if one adds up various factors like the measuring process, facilitating a successful building workshop, gathering materials and finally the installation of adobe trench warfare on top of the tower, undoubtedly a time span of more than 24 months would be essential to create the GST.

The field studies of the authors at the GST (2017) led them to propose two historical phases, including 13 architectural layers, all fall within the historical period of Safavids: the first historical phase is the Ottoman occupation of Tabriz (1585 – 1603) and the second phase is the armed preparation and military alert of Shah Abbās as soon as he became aware of the imminent armed threat of the Ottoman Murad Pasha, in 1610 AD (Fig. 2; Table. 1).

The initial historical phase (1585-1603) is presented at the stone cylinder tower with an additional clay layer on the top which represents 11 architectural layers from I-i to I-xi: a) the stable foundation made of lime mortars, tomb stones and rock stones, b) the eighth architectural layers made of cobblestones and lime mortars, c) a level of timber mesh and d) a mud brick level represents ruins of rifle embrasure placed on the stone roof of the tower; additionally, it is difficult to deny the vital role of these compressive (stone blocks) and tensile (timber mesh) units since the whole complex stands for generations even in the destructive shakes of the year 1780 exceeding the 7.7 in Richter magnitude scale. As this arrangement of a full projected tower has never been appeared nor spread throughout Iran, it may illustrate similar aspects of common phenomenon in the Ottoman architecture in Iran during years 1585 – 1603.

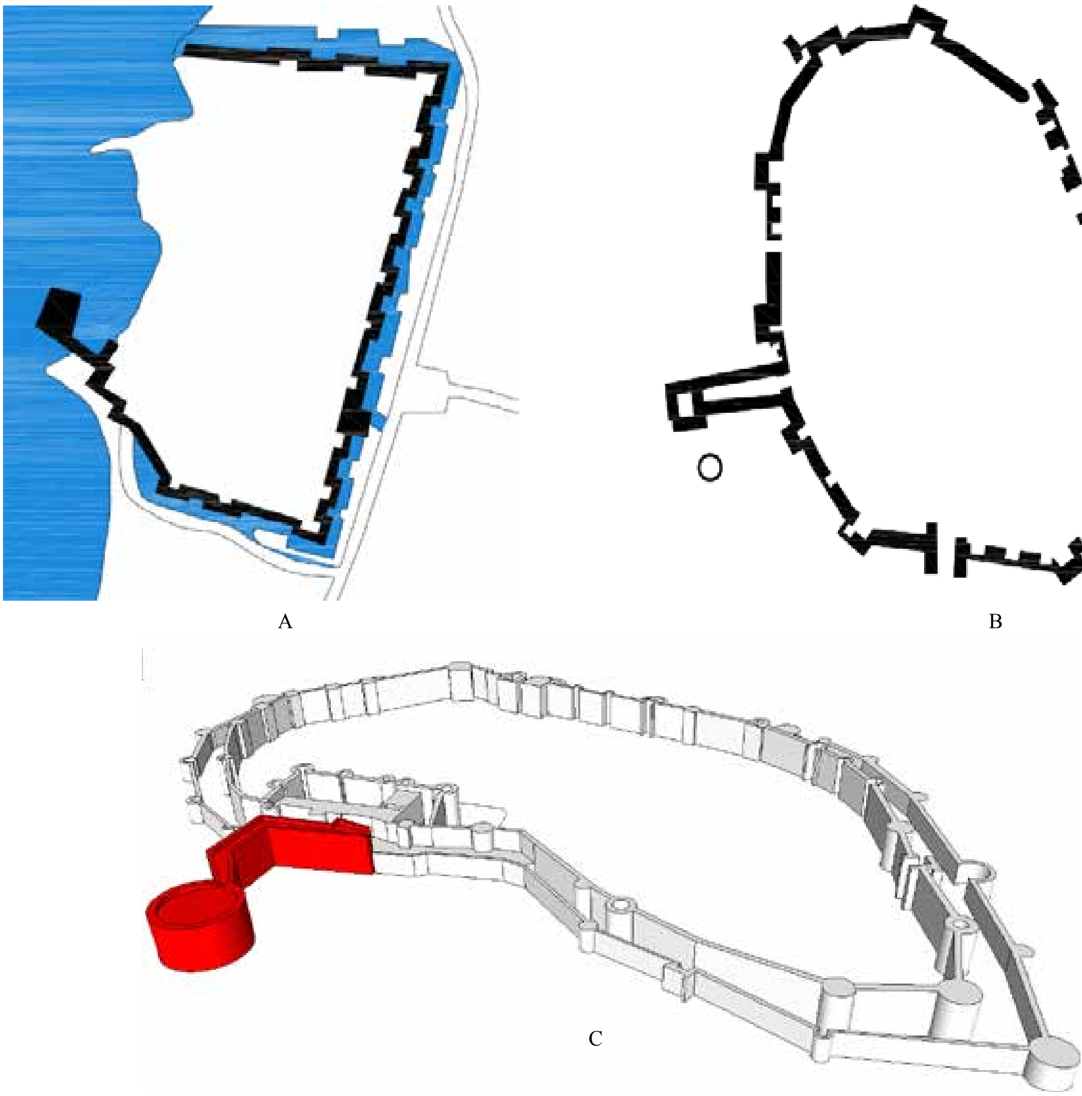

Fig. 7. The position of an 180º view full projected tower at three non-Iranian samples: A. The Byzantine Caesarea (Molin, 1998) B. The English Framlingham (Plowman, 2006) C. The French Carcassonne. Modeling by A. Moradi.

The second historical phase (1610) including upper interventions made of clay materials and earthen plasters on top of the mud bricks or the same structure as seen in Ottoman crenel (I-xi) represents two architectural sub- phases as follow: the uppermost layer (II-ii), a shallow deposit of ruins composed of mud bricks, earthen plasters and bricks, indicates quick reconstructions ordered by Shah Abbās during his 1610 defensive preparation and following the armed alert; while the beneath layer (II-i) is composed of collapsed mud bricks and reused bricks with off situ tile fragments from the 14^{th} - 15^{th} AD which implies a hasty repair and the need of quick completion. The advent of this combination all around the Rashidiyya enclosure points to a quick renewal of defensive rampart due to fears over the armed imminent threat of the Ottoman Murad Pasha in 1610.

- **Ordnance**

It is noteworthy that neither archaeological findings nor historical reports attest to the possibility of long range heavy artillery deployed by the Ottoman and the Safavid armies in the battles over Tabriz during the years 1603, 1610 and 1635. The order of Ottoman Sinan Pasha to cast 'Zarbazan Shahi ' and 'Zarbazan Miāna' guns for the battlefield of Azerbaijan proves the fact that Ottomans in Tabriz and Urmia only had some light anti- infantry guns known as 'Zarbazan

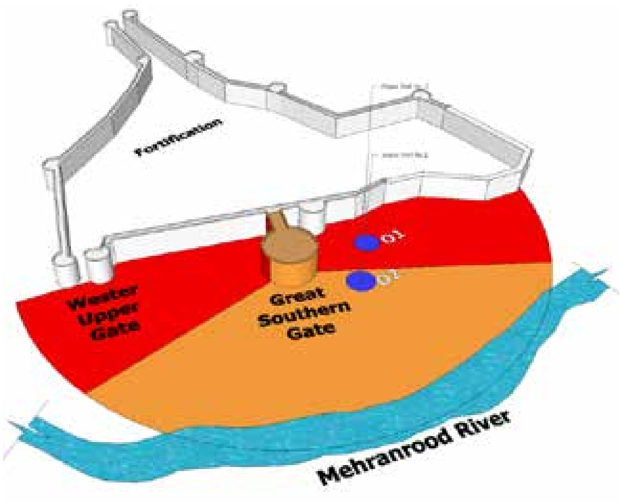

Fig. 8. The schematic view of GST and its around areas are shown: 180° view of the GST and fire cover of musketeers over two water wells, north riverside of Mehrānrūd, upper western gate, east end of the ramparts and southern lowlands in front of the fort of Rashidi. Lands marked as A & B are directly under arquebus fire of the GST. Modeling by A. Moradi.

Kūchak'; though this type of gun do not require a high, heavy and strong tower to be built as the GST, Rashidiyya. It should be noted that Ottoman generals (Pashalar) did prefer to keep more quick ability of army maneuvering by deployment of light anti-infantry guns as 'Zanbūrak', 'Zarbazan Kūchak' and 'Zarbazan Miāna' as well as matchlock heavy rifles (Arquebus) as 'Shākāloz', 'Misteque' and 'Prangi' (Ágoston, 2000a, 240-242; Aydüz, 2011, 1-37). These Ottoman matchlock heavy rifles, installed on legs, have 13.5-29mm caliber and maximum range of 150m (Ágoston, 2000b, 459-461).

Interpretation and conclusion

The analytic approach into architectonics, field observation of the structure including the geo-morph as well as reviewing of Safavid & Ottoman historical records on ordnance let the authors to conclude the plan and architectonic of GST, inspired by the medieval period European military architecture - originated in Roman and Byzantine traditions of architecture –was built during 1585 – 1603 AD. It should be pointed out the fact that professional Ottoman engineers and architect masters were completely familiar to the Roman and Byzantine architecture as well.

In addition, it is interesting to note that 'Cigala Joseph Sinan Pasha', ruling over Tabriz from the late 1585 until the mid-1603, was one of the Italian descent Pashas who converted into Islam and served to the Ottoman royal Court; therefore, it is reasonable that Great Southern Tower in Rab'e Rashidi might be his plan and idea. Let to remind J. B. Tavernier (1676) has reported the Ottomans as the architects of 'the Fort at Rashidiyya'. According to *Ālamārā-ye Abbāsi*, one maybe suppose the fort of Ottoman Pasha in Tabriz as the same fort of Rashidiyya. Such a supposition is false; because Özdemir Zāda Ottoman Pasha suddenly dead a few weeks after his order to build a fort in 'Nasiriyya' of Tabriz, not Rashidiyya.

The GST that was able to remain resistant against landslides and earthquakes measuring 7.7 on the Richter scale could not be deployed for artillery purposes because the use of such artillery by the Safavids and the Ottomans in Tabriz has not yet been verified in any archaeological contexts or historical documents. Accordingly, wooden mesh applied to the tower as a technique to build it light by decreasing of load, prove that Ottoman engineers had no intention to deploy long range heavy cannons on the top of GST. Indeed the construction of such a heavy, tall and costly tower was never necessary for short range and light caliber infantry guns as 'Zanbūrak' and 'Zarbazan Kūchak'.

The gentle rise of slope at midst of south and SE front parts of the curtain wall and GST should be regarded as the Achille`s heel for the defense system of the Rashidiyya Fort. Nonetheless, in addition to strengthening of defensive points at the south and SE parts of the fort, two more tactical abilities for the Ottoman commanders were being available by the GST:

Armed with heavy matchlock arquebus type of muskets, if a musketeer platoon of Ottoman Janissaries (Tüfekendāzān) to keep embrasures at top of the GST, they would defend two water wells at the down of GST, the hills of Valyānkūh and northern riverside of Mehrānrūd; in addition to

Table. 1. The periodization and stratification of GST. Source: Ajorloo, 2017; 2018.

Layer	The characteristics of archaeological context and building materials	Proposed relative dating
I-i	A horizontal level of stair cobbles, like to a staircase, at the ridge of GST foundation. The mortar is lime.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-ii	A composition of tomb stones, lime mortar and cobblestones has raised up to the foundation. Tomb stones are used as façade in stair shape.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-iii	A composition of tomb stones, lime mortar and cobblestones. Tomb stones are used as façade in stair shape.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-iv	A composition of lime mortar and cobblestones.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-v	The stone mesh made of a row of tomb stones.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-vi	A composition of lime mortar and cobblestones.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-vii	The wooden mesh made of timbers applied into the composition of lime mortar and cobblestones.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-viii	A composition of lime mortar and cobblestones.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-ix	The stone mesh made of a row of tomb stones.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-x	A composition of lime mortar and cobblestones which touch the stone roof of GST.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
I-xi	Clay and soil debris of well- made mud brick structures on the top of stone roof of GST. This feature is remnants of embrasure.	1585-1603 (Made by the Ottoman Cigala Joseph Sinan Pasha)
II-i	A texture of clay and soil debris of earthen plasters and mud bricks mixed with earlier inclusions and old debris.	1610 (Quickly made by Shah Abbās the Great)
II-ii	A shallow clay and soil deposit of surface layer including debris of mud brick structure of a crenel.	1610 (Quickly made by Shah Abbās the Great)

such tactical superiorities, from the top of GST, that Ottoman rifle Janissaries have a 180º scout view to target all Safavid infantries and cavalries were about to attack the fort of Rashidiyya from the south and SE lowlands. The 180º scout view moreover gave riflemen the possibility to shoot invaders of distant east end of rampart as well as the western upper gate of the fort (Fig. 8).

Eventually, the Ottoman regiment of Cigala Sinan Pasha, after the Iranian rebels, was forced to leave the fort of Rashidiyya heading to the Khoy and Salmas in 1603; and suddenly the Safavid Shah Abbās by taking the advantage of the Ottomans` unawareness quickly arrived in Tabriz.

The layer (II) of mud brick, clay, and earthen plaster remains at the top of GST, entire the small towers and over the ramparts of Rashidiyya Fort should be interpreted as quickly reconstructions and refurbishment ordered by the Safavid Shah Abbās the Great, as a part of an urgently defensive plan for Tabriz against armed imminent threat of the Ottoman Murad Pasha in 1610.

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Endnote

1. On the historical subjectivity and archaeological objectivity see: Tringham, 2015, 27-54; Praetzellis, Praetzellis, 2015.
2. It should be noted that basic restoration studies of the GST is undergoing by Christian H. Fuchs from DAI.
3. For abductive reasoning see e.g. Douven, 2017.
4. A result of another architectonic field study on the GST, under Christian H. Fuchs from DAI, is forthcoming.
5. The 'Château de Falaise' in Normandy of France is another sample.

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